

# STATUS OF VIRGINIA'S WATER RESOURCES

## A Report on Virginia's Water Resources Management Activities

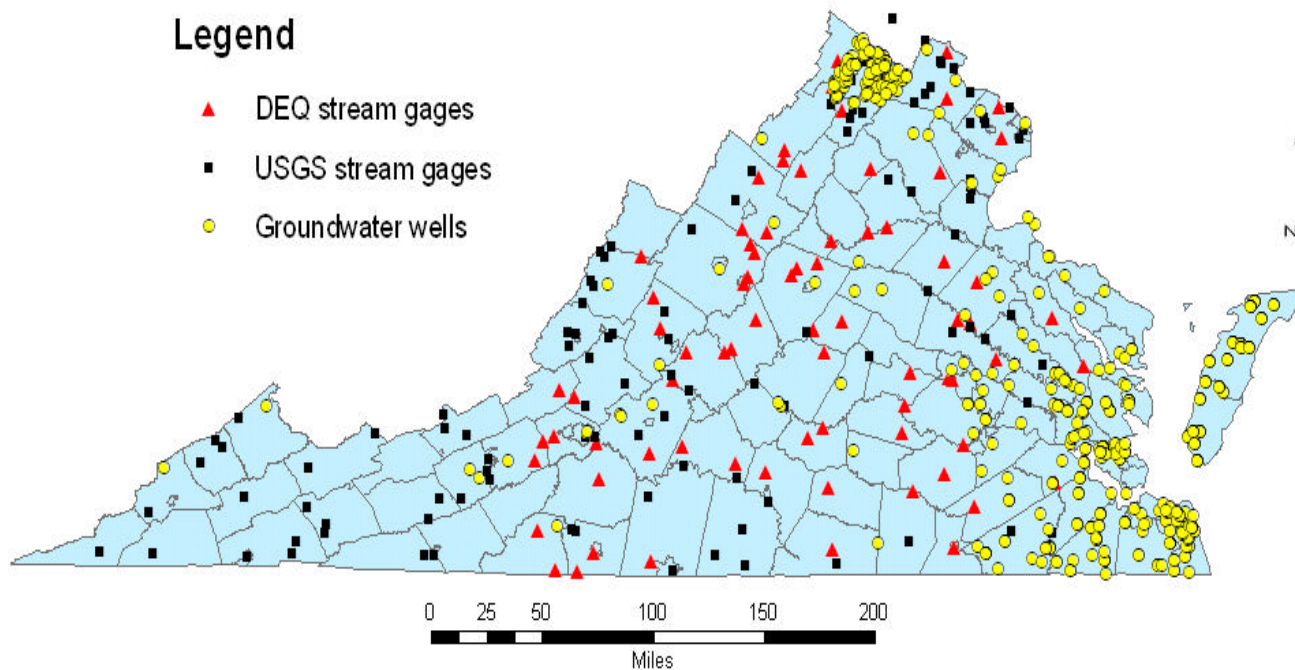
Scott Kudlas  
Office of Surface and Ground Water Supply  
Planning  
March 29, 2011

# Report on Status of Water Resources

- Required by statute to be submitted annually to GA
- Includes:
  - Program Summaries
  - Significant Program activities/accomplishments
  - Water Use reporting breakdown by use categories and source types
  - Important Water Resource Issues

# Surface Water Investigations (SWI) Program

- 74 surface water gages/42 groundwater wells
- Over 500 discharge measurements
- 62 miscellaneous TMDL sites

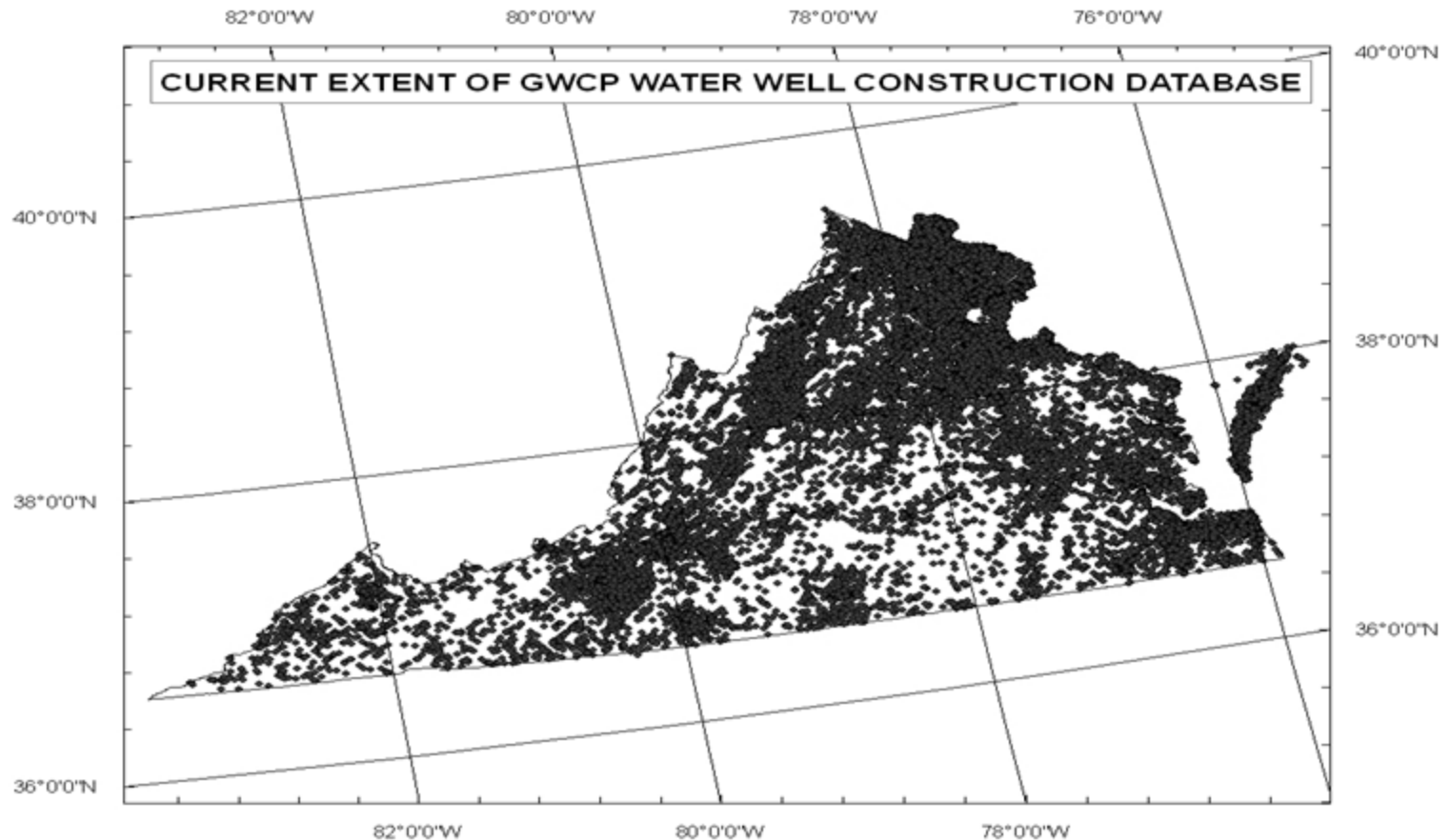


# Groundwater Characterization Program

- Added new wells in Northumberland and New Kent Counties and in far southwest VA
- Regional Groundwater Resources Reports drafted for the Piedmont and Blue Ridge Physiographic provinces
- Water Well Construction Data
- Geochemical Data
- Springs Data

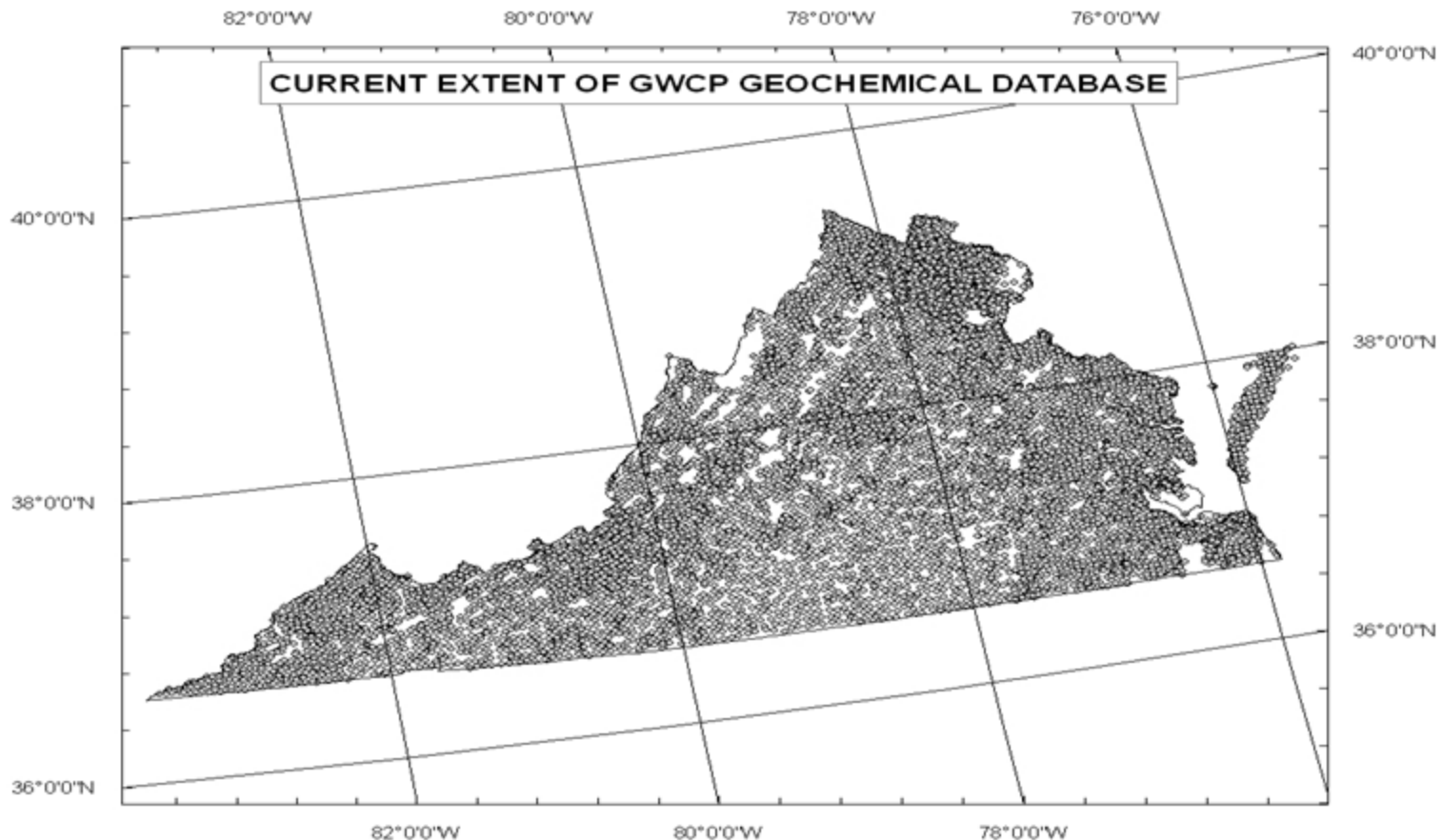
# Statewide Water Well Construction Database

- GIS database now contains approximately 35,000 historic well construction records



# Statewide Geochemical Databases

- Geochemical database now contains natural geochemical conditions from approximately 23,000 groundwater samples originating from approximately 12,400 wells



# Spring Database

- The spring database has 909 spring locations associated with over 2100 field measurements, and analyses from 331 water quality sampling events.




## Regional Water Supply Planning Programs (due 2011):

Southwest Region (Cumberland Plateau, LENOWISCO, & Mount Rogers PDC's)	Upper Shenandoah River Basin (CSPDC)
New River Valley Region (NRVPDC) <sup>1</sup>	Greene County & Stanardsville
Craig County & New Castle (RVARC)	Albemarle County, Charlottesville City, Town of Scottsville
Greater Roanoke Region (RVARC)	Orange County & Towns
West Piedmont PDC	Spotsylvania County & Fredericksburg City
Upper James River Basin (CSPDC & RVARC)	Louisa County & Towns
Region 2000 LGC	Fluvanna County & Columbia
Buckingham County & Dillwyn (CRC)	Cumberland, Powhatan, Goochland, & Henrico Counties
Prince Edward County & Farmville	Hanover County & Ashland <sup>2</sup>
Nottoway County & Towns	Caroline County & Bowling Green <sup>2</sup>
Charlotte County & Towns	Middle Peninsula PDC
Halifax County & Towns	Northern Neck PDC
Lake Country Region (Southside PDC)	Accomack County & Towns <sup>3</sup> (ANPDC)
Lunenburg County & Towns (CRC)	Northampton County & Towns (ANPDC)
Greensville & Sussex Counties, Emporia City, & Towns	Hampton Roads PDC
Appomattox River Water Authority (Chesterfield, Prince George, & Dinwiddie Counties; Cities of Petersburg & Colonial Heights; Town of McKenney) & the City of Hopewell	

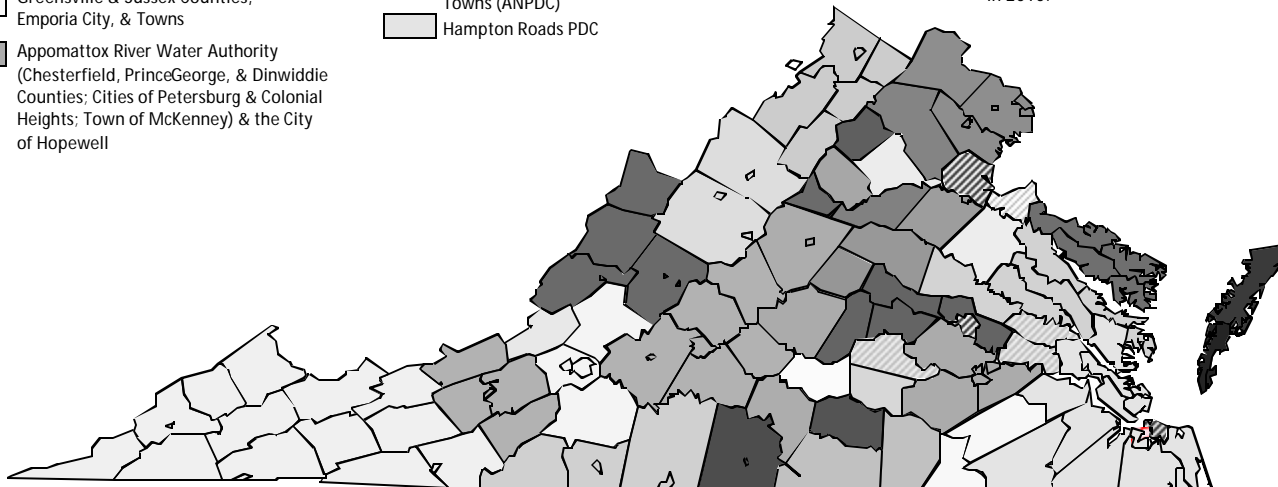
Northern Shenandoah Valley PDC
Rappahannock County & Washington
Madison County & Madison (Town)
Culpeper County & Culpeper (Town)
Fauquier County & Towns <sup>4</sup>
Northern Virginia RC <sup>5</sup>

<sup>1</sup> The Towns of Blacksburg & Christiansburg are working together on a separate regional program. Due to scale, this region is not represented on the map.

## Local Water Supply Planning Programs & Deadlines:

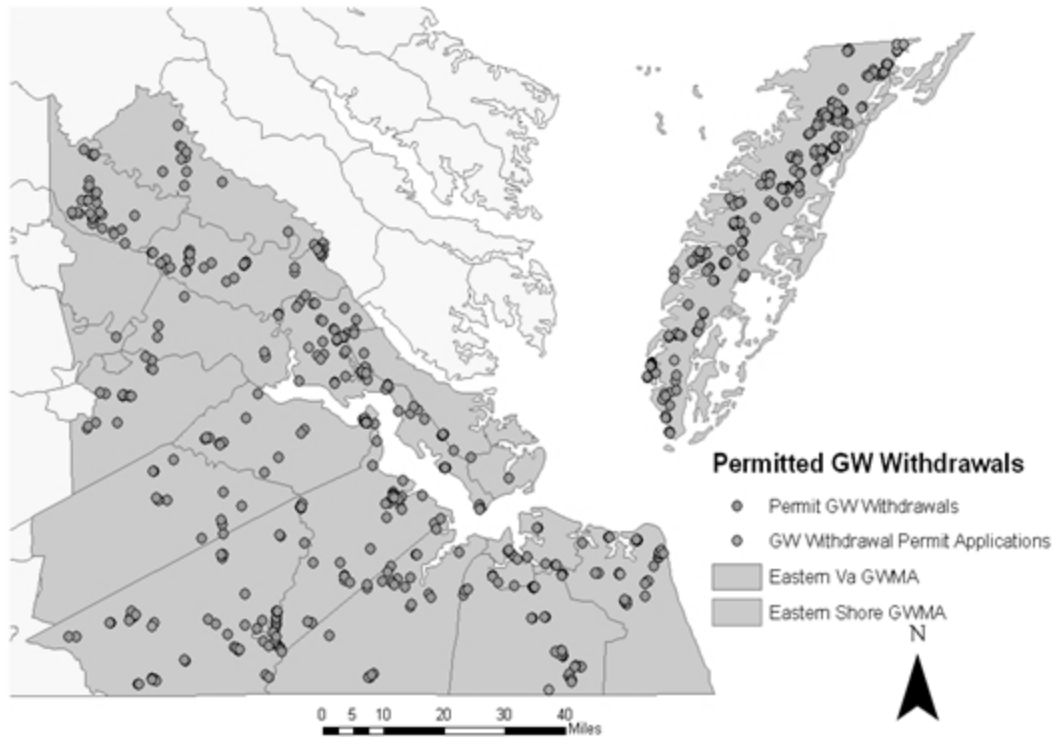
	Submitted November 2, 2008
	Submitted November 2, 2009
	Due 2010

<sup>2, 3, 4, 5</sup> The Towns of Port Royal, Chincoteague, Warrenton, & Hillsboro are developing local programs, each due in 2010.

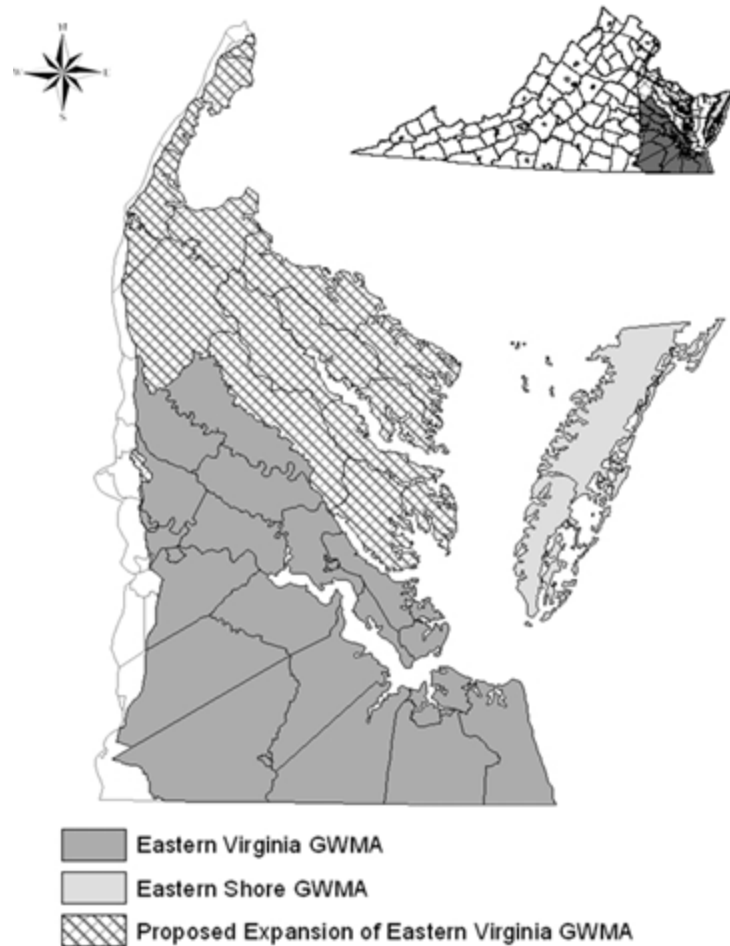




# Groundwater Withdrawal Permitting Program



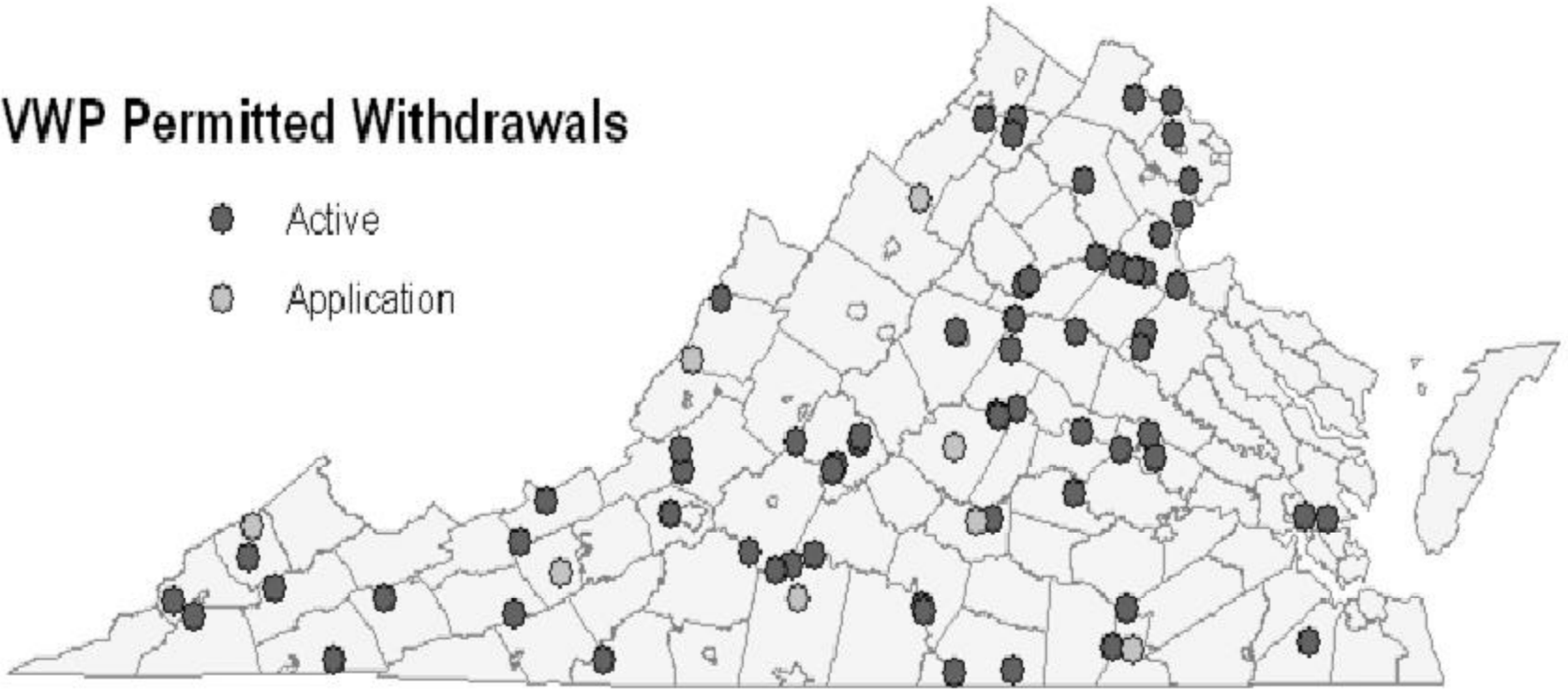
# Groundwater Withdrawal Permitting Program



# Virginia Water Protection Permit Program

## VWP Permitted Withdrawals

- Active
- Application



# SUMMARY OF WATER WITHDRAWALS IN 2009

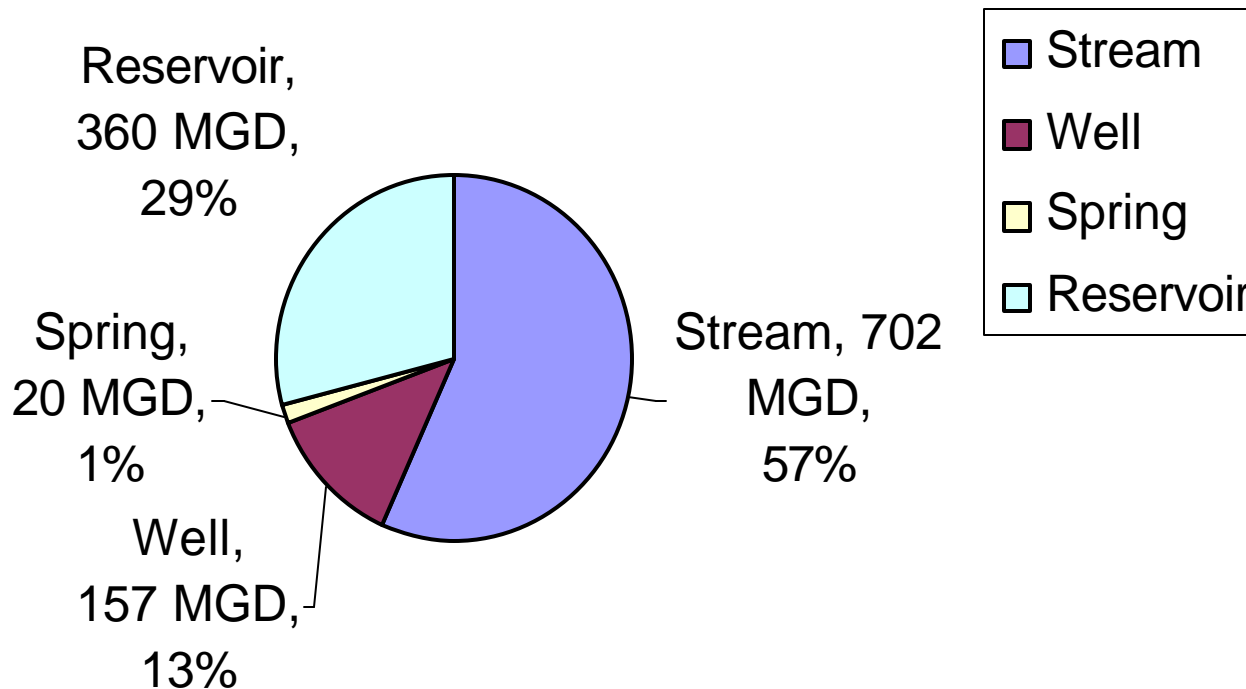
- Virginia Water Withdrawal Reporting Regulation (9VAC 25-200-10)
  - Success of electronic reporting option
    - DEQ received 2,412 water withdrawal reports electronically for 2009, which is 61% of the total number of reports received.
  - 1.25 BGD of water withdrawal reported
  - Public Water Supplies are largest overall users and show minor growth
  - Agricultural irrigation may be increasing but varies year to year due to climatic events
  - Manufacturing fluctuates

# Top 20 individual non-power generating water withdrawals

Owner	System	Category*	Total (MGD)
Honeywell International, Inc.	Hopewell Plant	MAN	99.33
Fairfax County Water Authority	Potomac River WTP	PWS	88.48
Western Refining Yorktown Inc	Yorktown Refinery	MAN	64.10
Richmond, City of	Richmond (City) WTP	PWS	63.73
Norfolk, City of	Western Branch Reservoir	PWS	60.75
Duke Energy Generation Services of Narrows	Celco Plant	MAN	58.04
Fairfax County Water Authority	Occoquan Reservoir	PWS	56.09
Meadwestvaco Corporation	Covington Plant	MAN	37.93
International Paper Corp.	Franklin Mill	MAN	32.20
Appomattox River Water Authority	Lake Chesdin WTP	PWS	29.01
Virginia Beach, City of	Virginia Beach Service Area	PWS	27.66
Dupont E I De Nemours & Co	Spruance Plant	MAN	26.80
Newport News, City of	Lee Hall WTP And ROF	PWS	25.33
Newport News, City of	Chickahominy River	PWS	23.72
Henrico County	Henrico County WTP	PWS	22.91
Newport News, City of	Hardwood's Mill WTP	PWS	21.37
Smurfit-Stone Container Corp.	West Point Plant	MAN	19.34
Virginia American Water Co	Hopewell District	PWS	19.09
Smurfit-Stone Container Corp.	Hopewell Plant	MAN	17.83
Portsmouth, City of	Lake Kilby WTP	PWS	15.09
		<b>TOTAL</b>	<b>808.8</b>

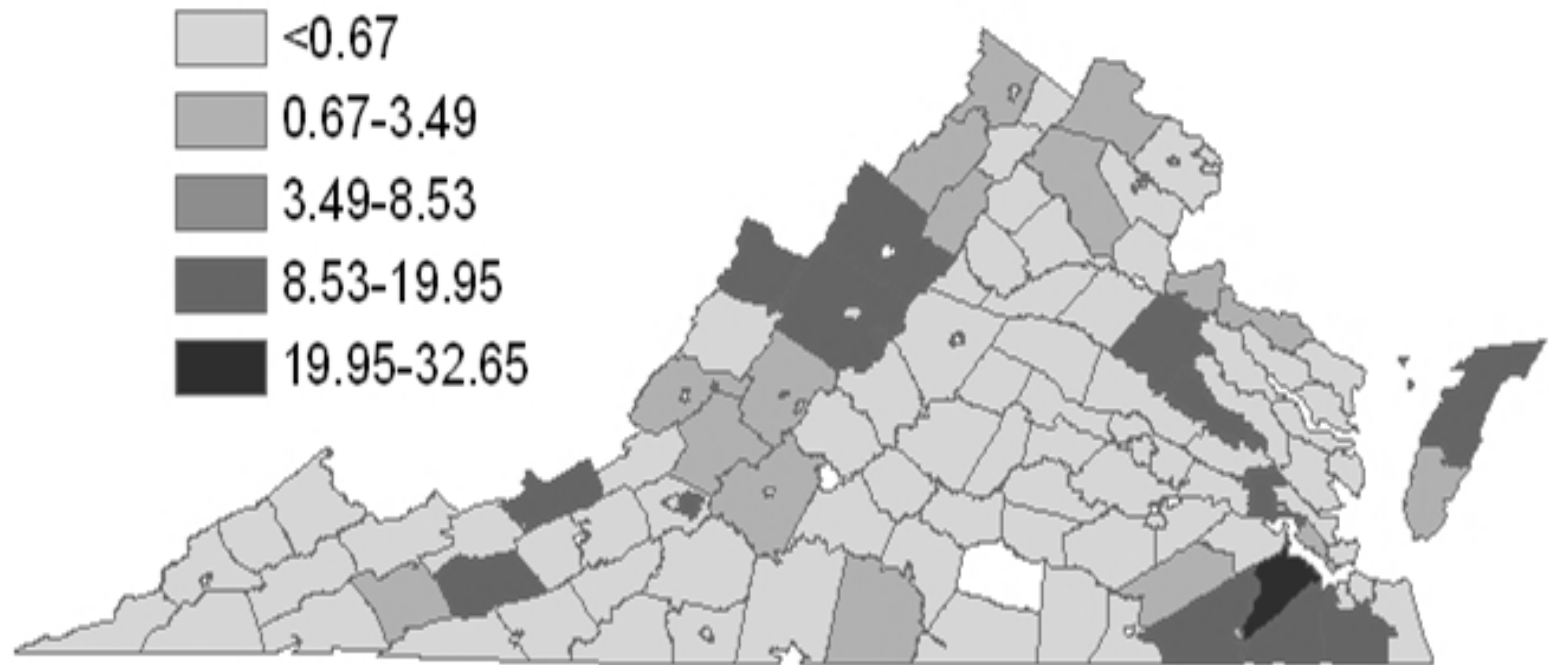
\*Category: MAN= Manufacturing, PWS= Public Water Supply

# Total Water Withdrawals by Source



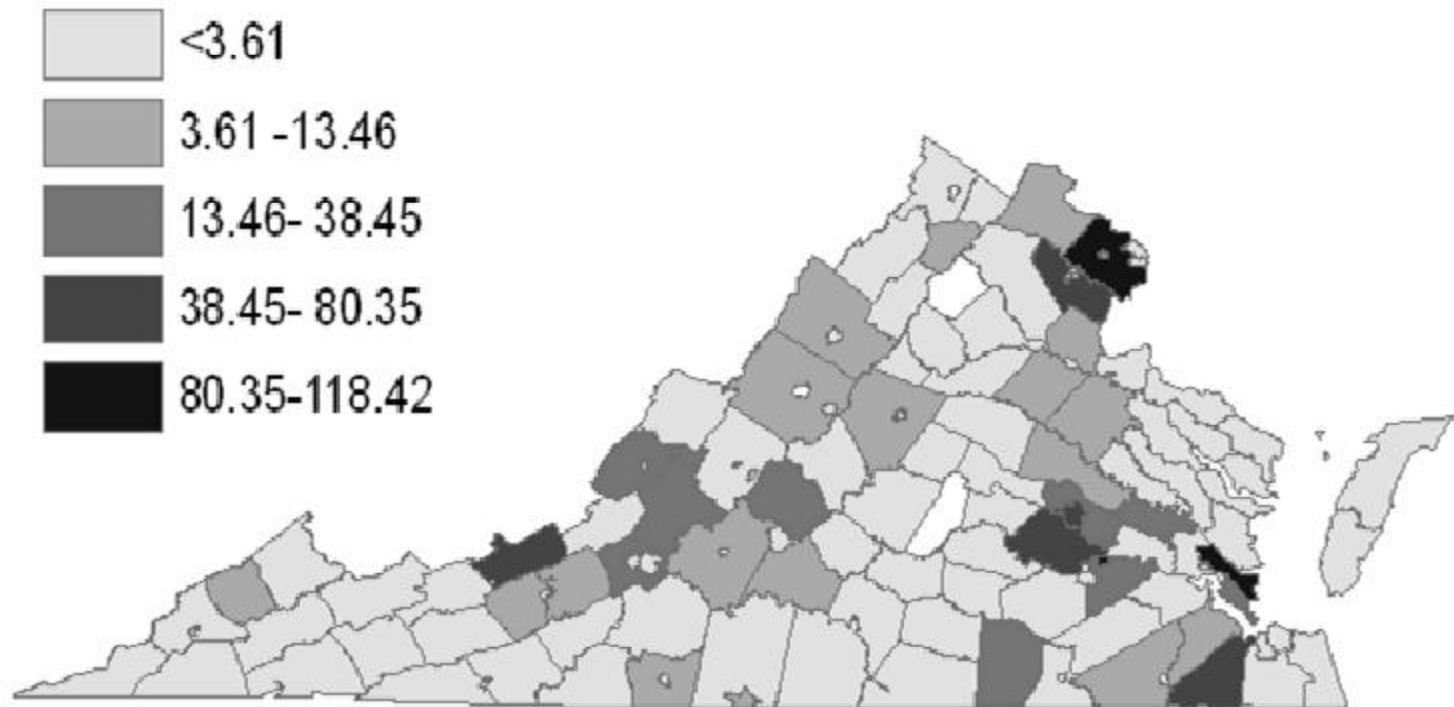
# Total Ground Water by Locality

2009 Withdrawal by Locality (MGD)



# Total Surface Water by Locality

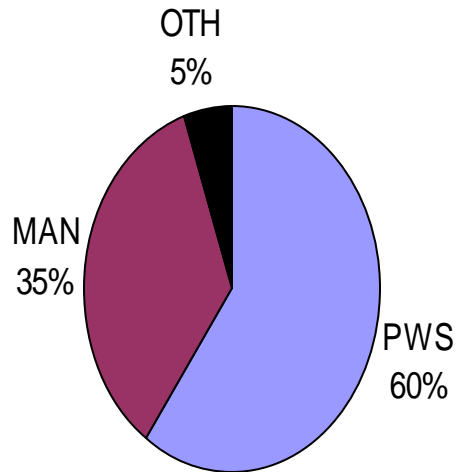
2009 Withdrawal by Locality (MGD)



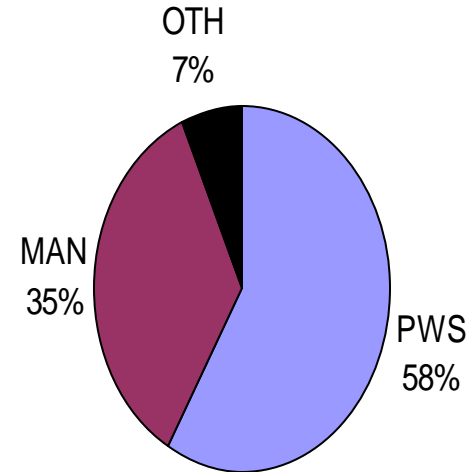


# Total Water Withdrawals by Category

2009 Water Use by Category

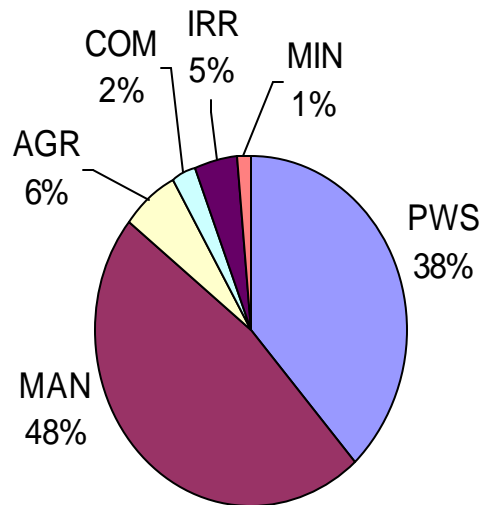


2005-2009 Average

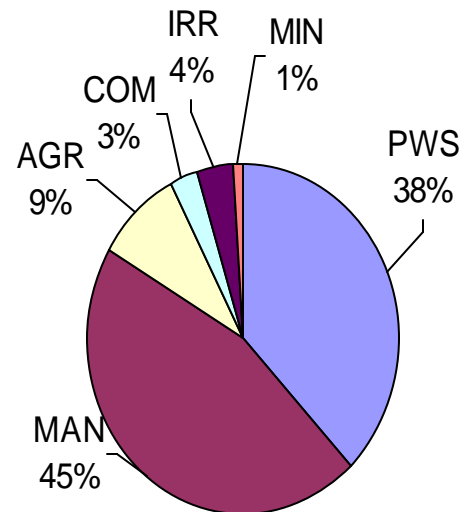


# Groundwater Withdrawals by Category

2009 Groundwater Use by Category

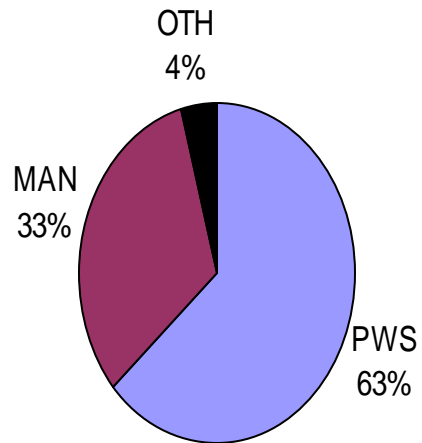


2005-2009 Average

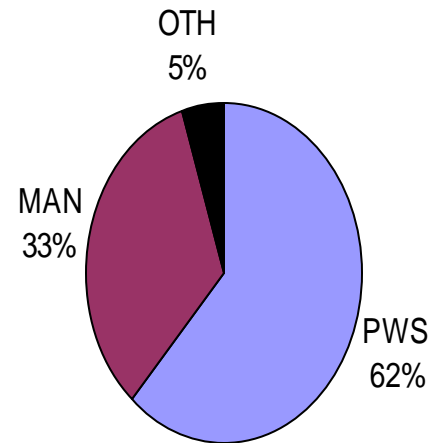


# Surface Water Withdrawals by Category

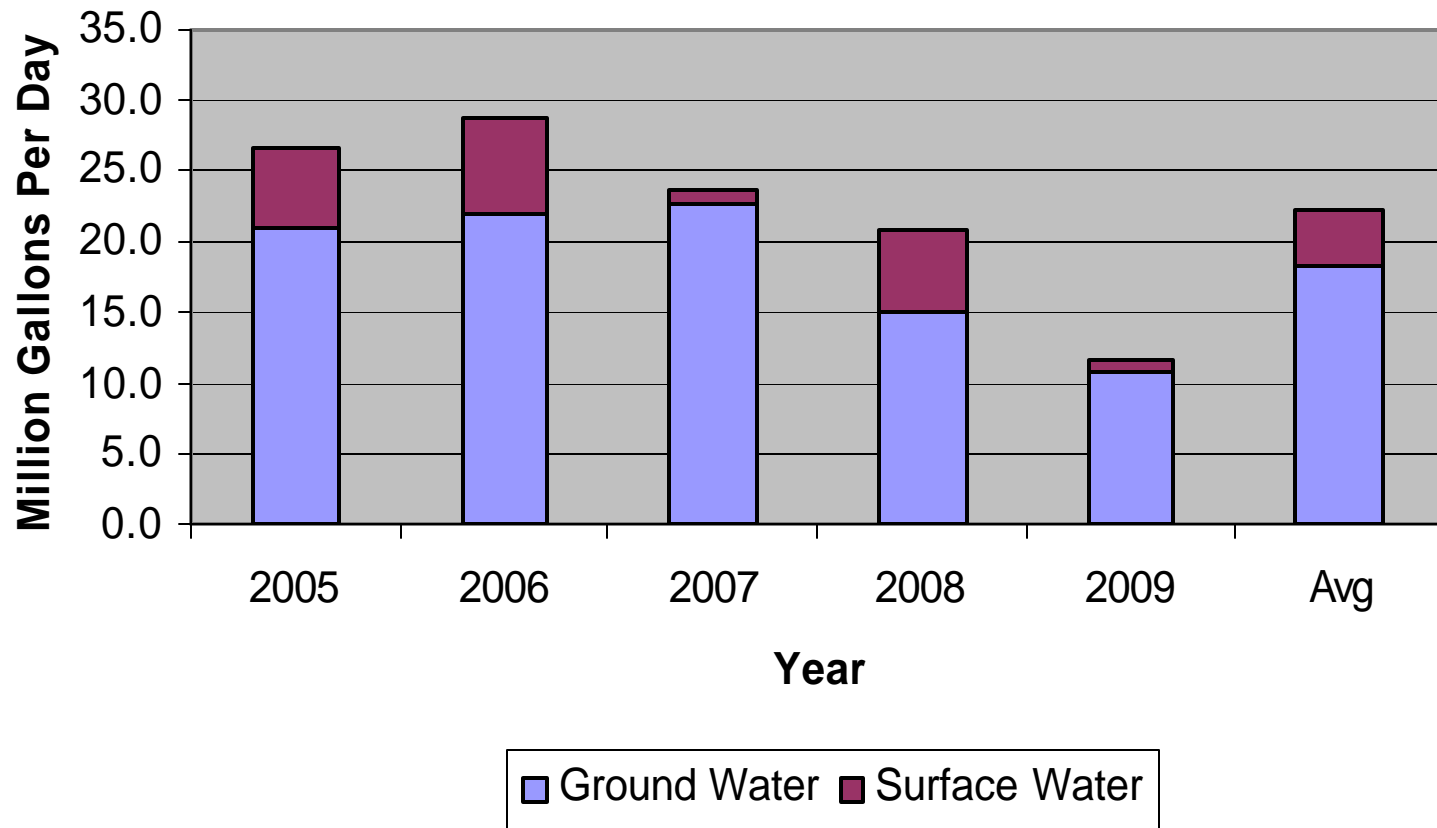
2009 Surface Water Use by Category



2005-2009 Average

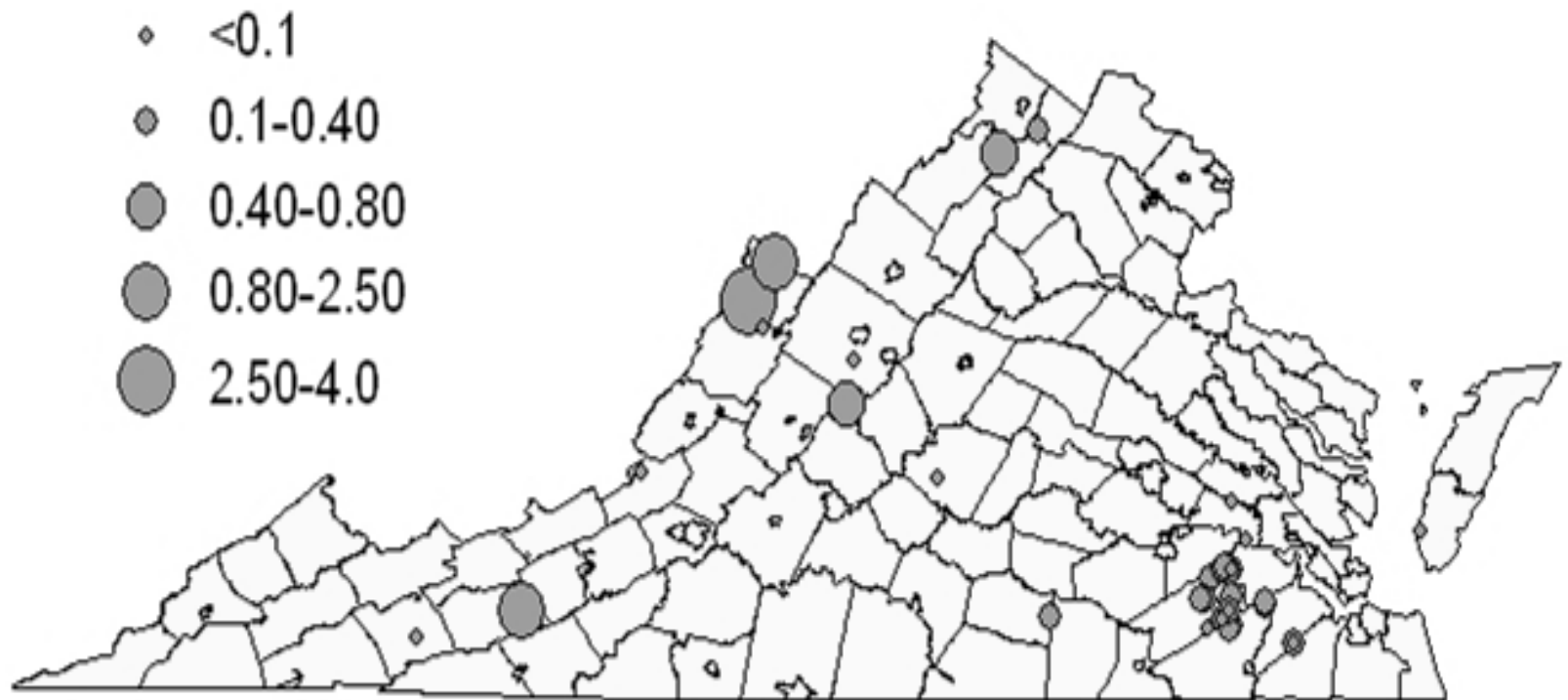


# Agricultural Water Withdrawals by Source

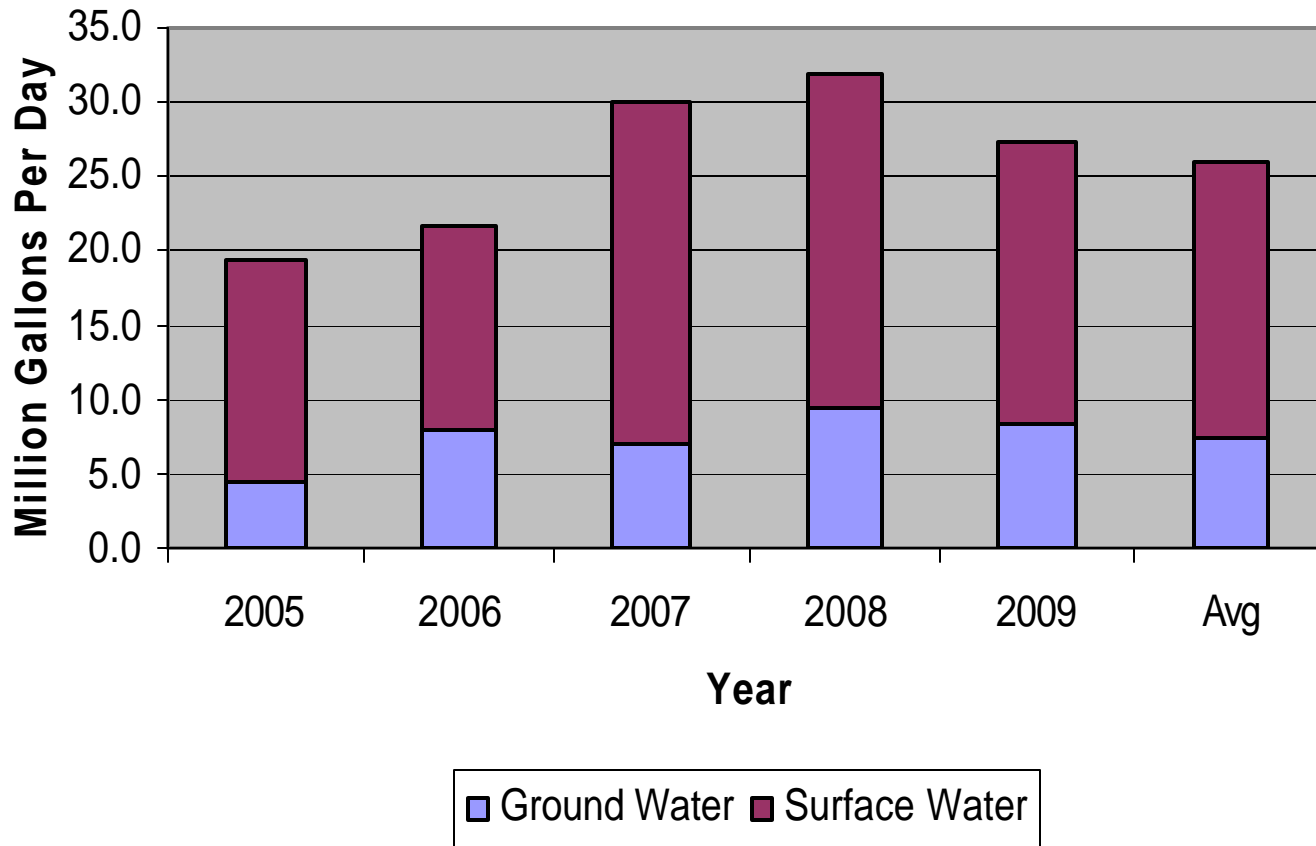


# Agricultural Water Withdrawals

## MGD by Withdrawal Point



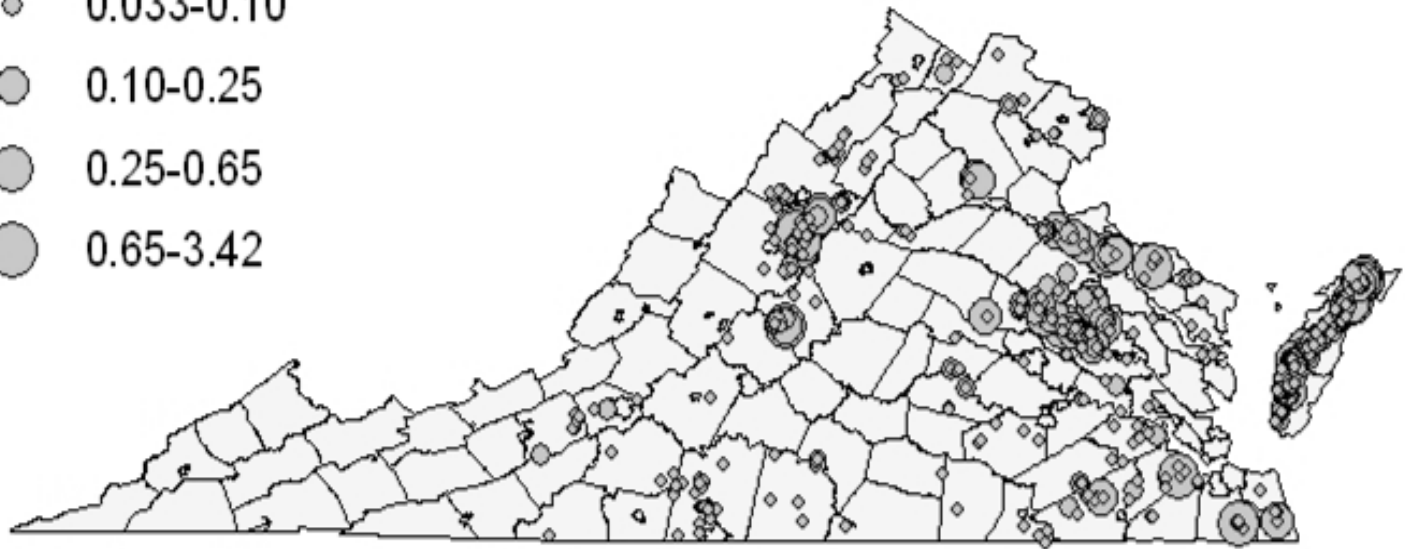
# Irrigation Water Withdrawals by Source



# Irrigation Water Withdrawals

## MGD by Withdrawal Point

- ◊ <0.033000
- 0.033-0.10
- 0.10-0.25
- 0.25-0.65
- 0.65-3.42

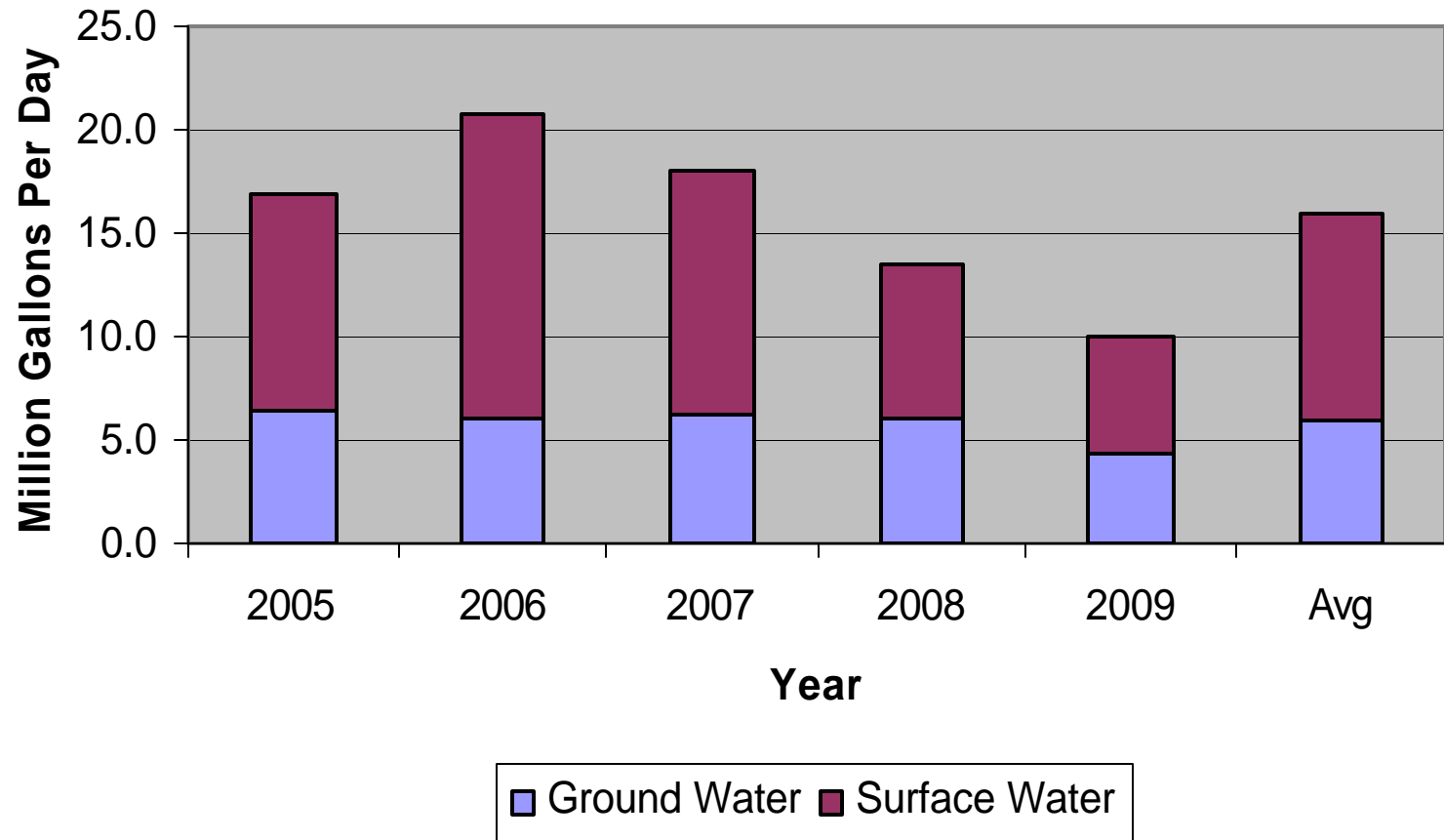


# Top Water Withdrawals for Irrigation

Owner Name	Facility	City/County	Type	Source	Avg. MGD <sub>1</sub>	2009 MGD
Robert C Darby and Sons	Arbuckle Farms	Accomack	GW	6 Dug Ponds	2.4	3.4
E Phillip and David L Hickman		Accomack	SW/GW	13 Farm Ponds, 1 Dug Pond	2.6	2.4
Saunders Brothers, Inc.		Nelson	SW/GW	6 surface water sources, 1 groundwater source	0.9	0.9
John Yaros		Northampton	SW	14 surface water sources	0.9	0.9
Eagle Tree Farms		Westmoreland	SW	Pee Dee Creek, Rappahannock River	0.8	0.8



# Commercial Water Withdrawals by Source

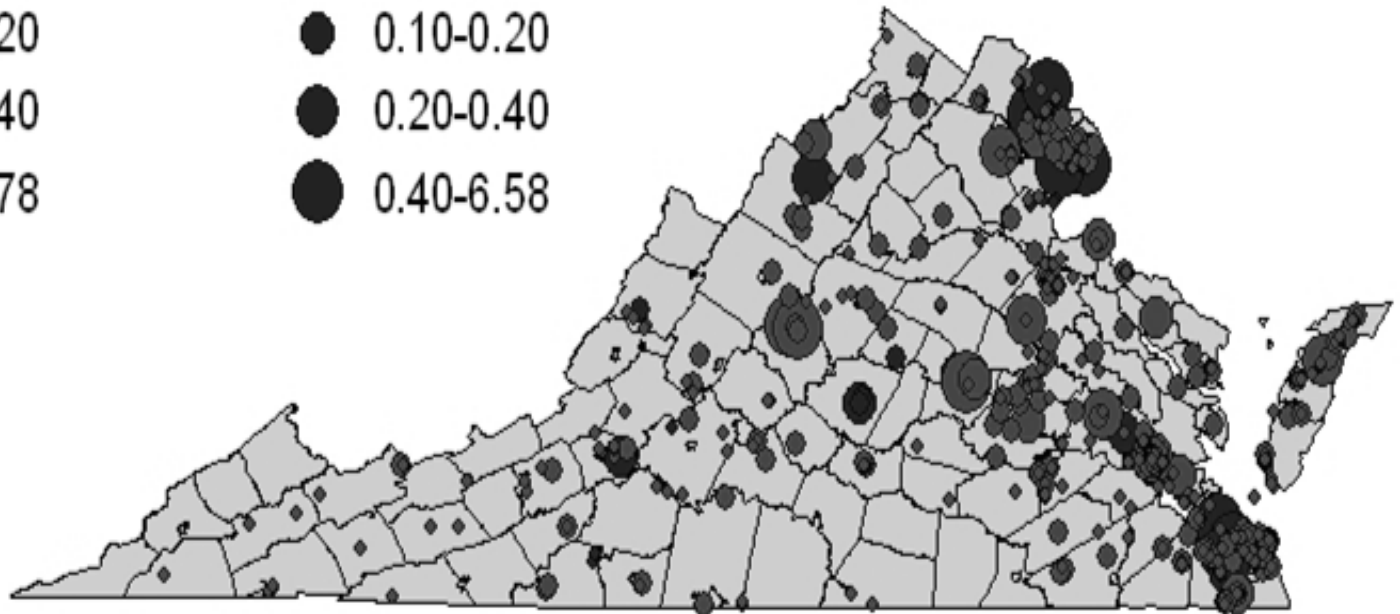


# Commercial Water Use

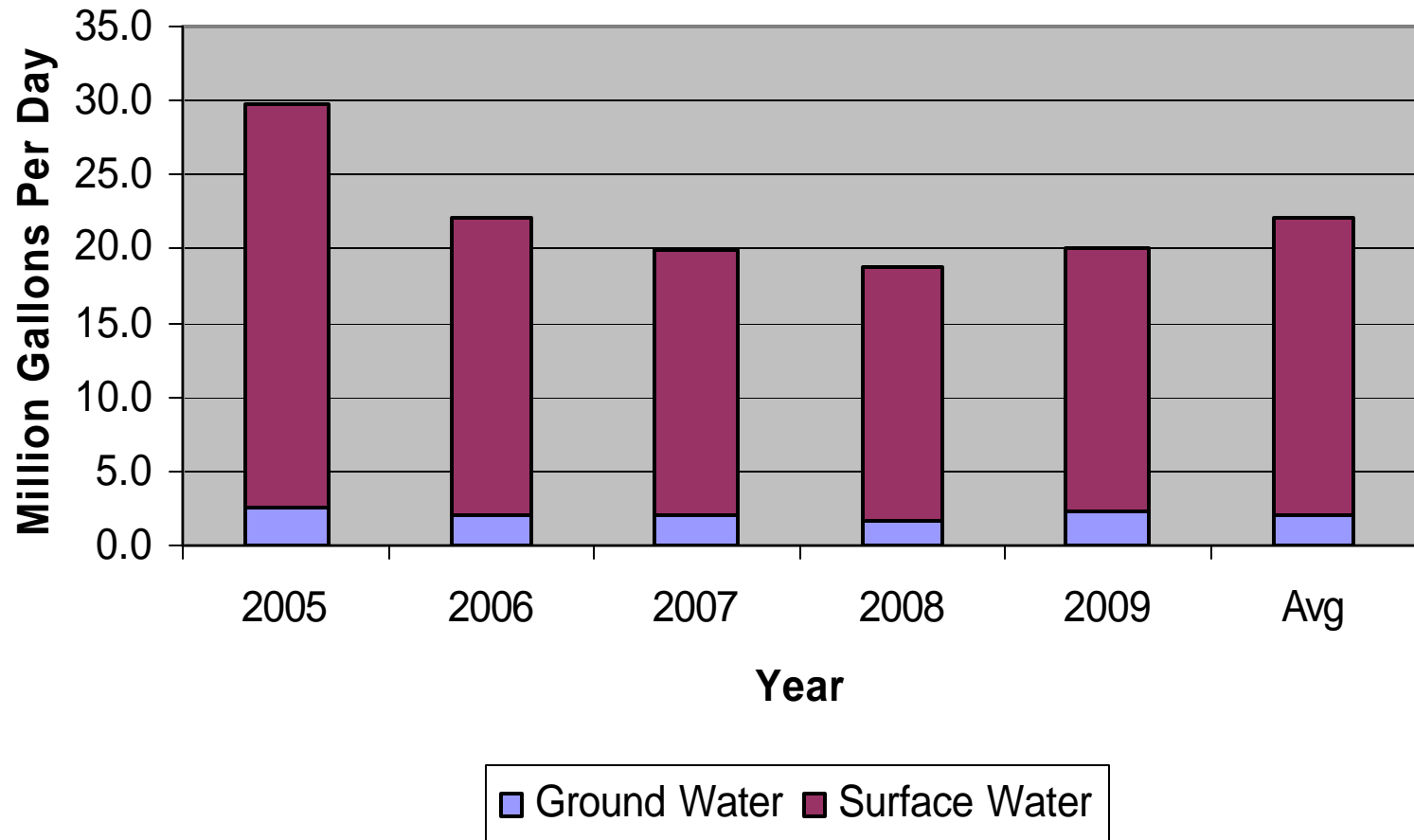
## MGD by Withdrawal Point    MGD Purchased

- <0.01
- 0.01-0.10
- 0.10-0.20
- 0.20-0.40
- 0.40-0.78

- <0.01
- 0.01- .10
- 0.10-0.20
- 0.20-0.40
- 0.40-6.58



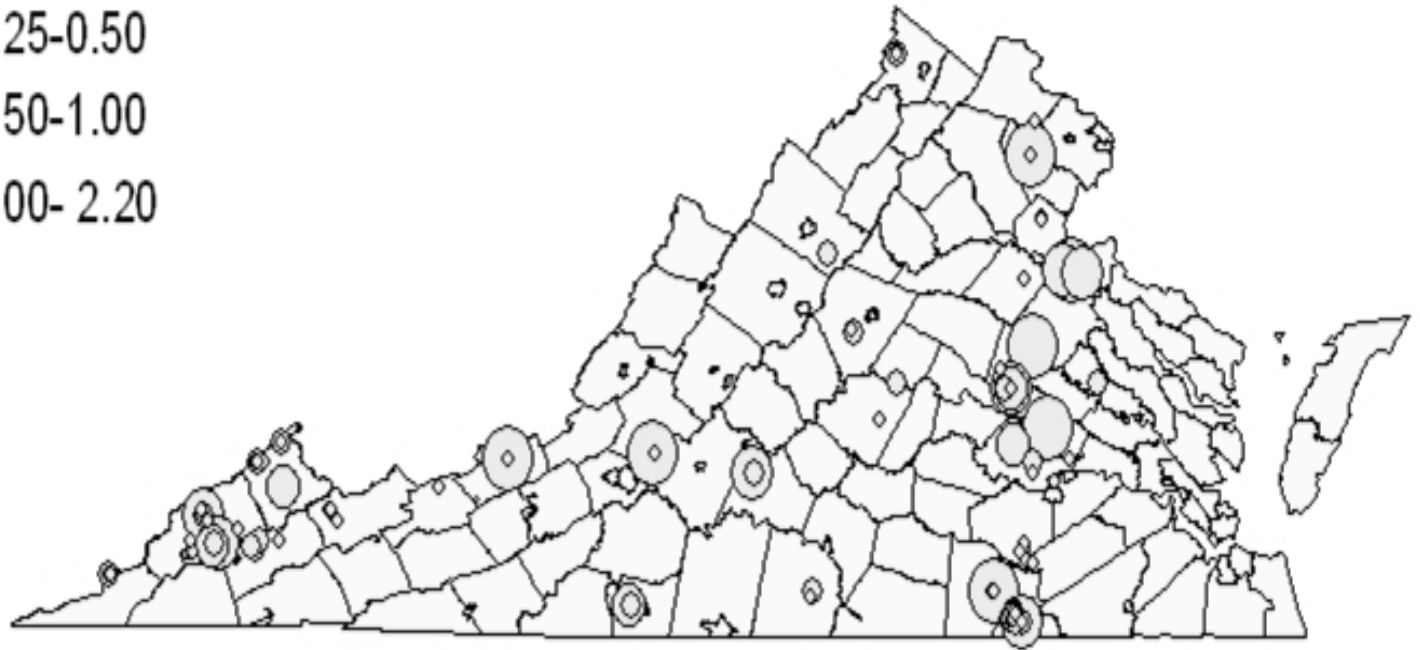
# Mining Water Withdrawals by Source



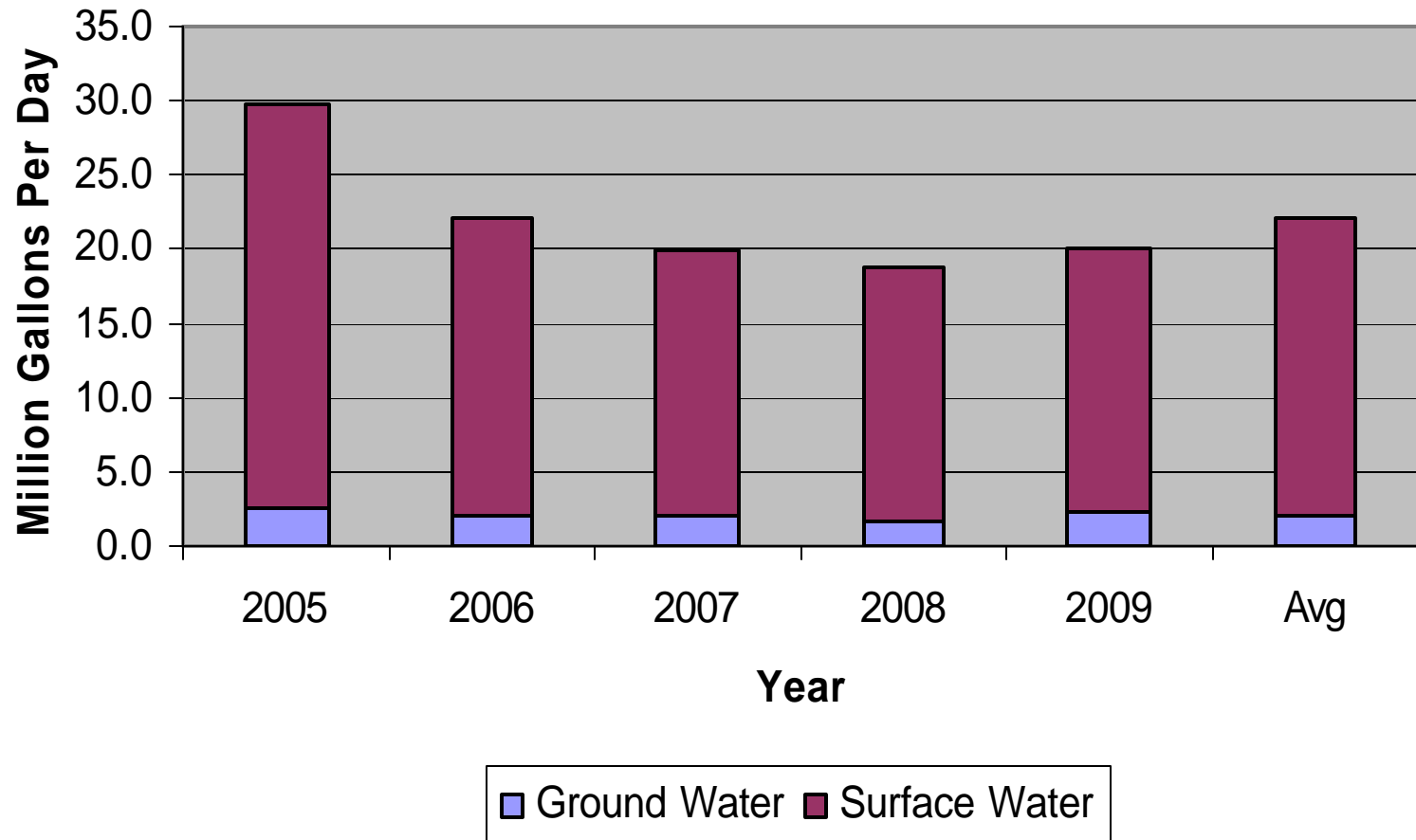
# Mining Water Use

## MGD by Withdrawal Point

- ◊ <0.01
- 0.01-0.25
- 0.25-0.50
- 0.50-1.00
- 1.00- 2.20



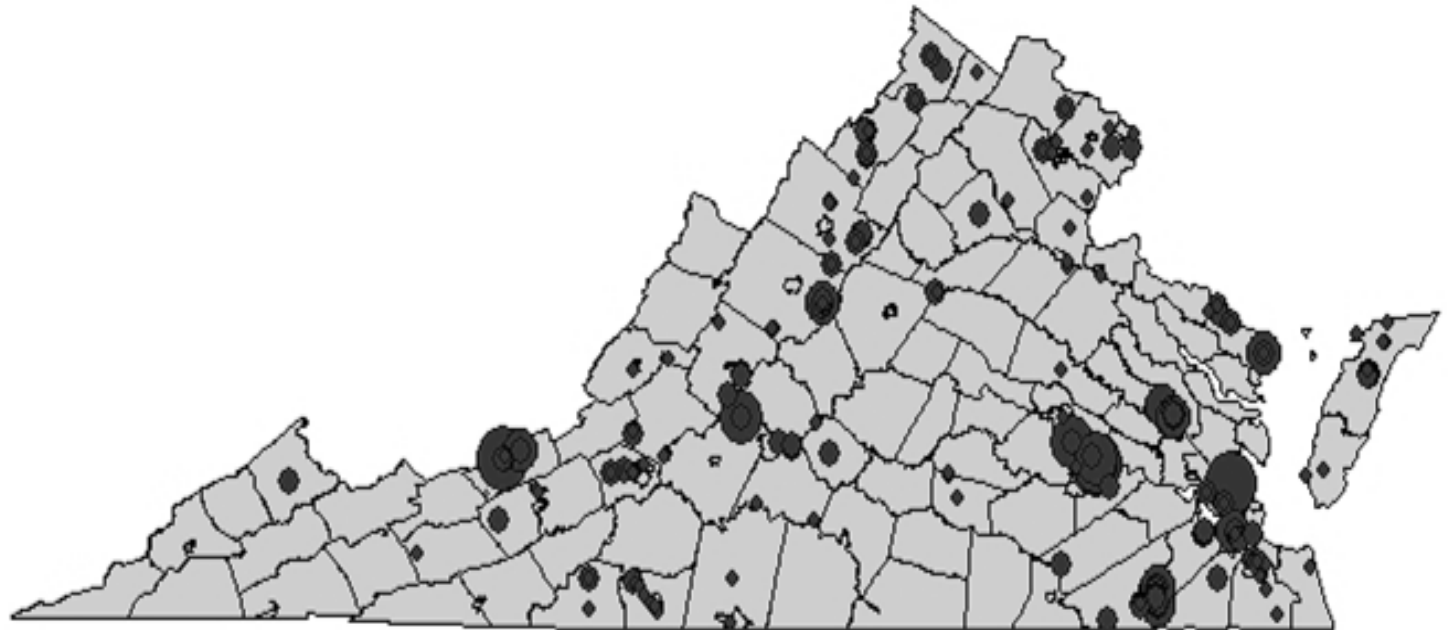
# Manufacturing Water Withdrawals by Source



# Manufacturing Water Use

## MGD by Withdrawal Point

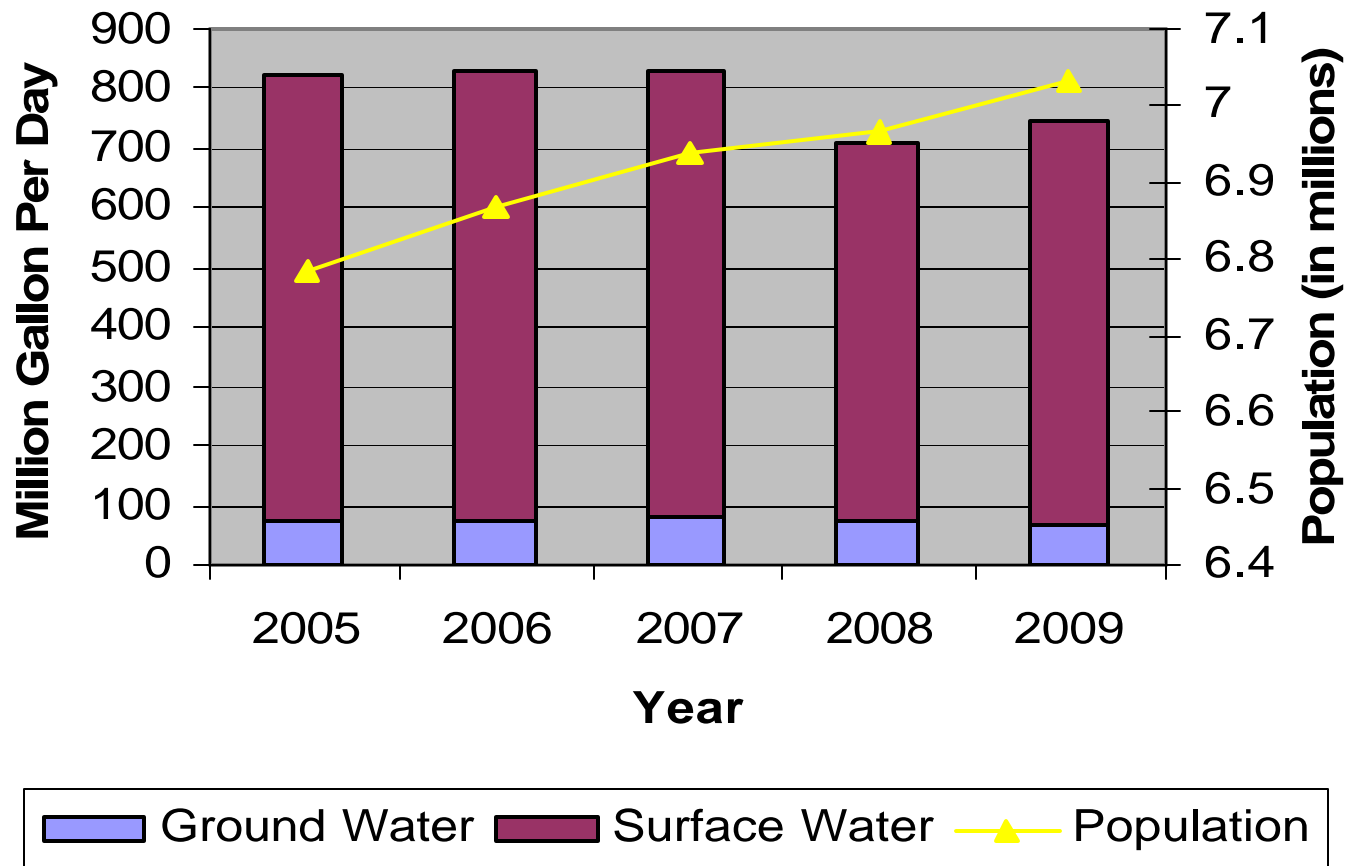
- <0.01
- 0.01- 2.0
- 2.0-10
- 10-30
- 30-99



# Top Water Withdrawals for Manufacturing

Owner Name	Facility	City/County	Manufacturing Sub-Category	Type	Source	Avg. MGD <sub>3</sub>	2009 MGD
Honeywell International, Inc.	Hopewell Plant	City of Hopewell	Chemicals & Allied Products	SW	James River	115.5	99.3
Western Refining Yorktown, Inc.	Yorktown Refinery	York County	Petroleum & Coal Products	SW	York River	61.1	64.1
Duke Energy Generation Services of Narrows	Celco Plant	Giles County	Chemicals & Allied Products	SW	New River	59.5	58.0
Meadwestvaco Corporation	Covington Plant	Alleghany County	Paper & Allied Products	SW	Jackson River	38.8	37.9
International Paper Corp.	Franklin Mill	Isle of Wight County	Paper & Allied Products	SW/G W	Blackwater River, 16 Wells	35.5	32.2
Dupont E I DeNemours & Co.	Spruance Plant	Chesterfield County	Chemicals & Allied Products	SW	James River	28.5	26.8

# Public Water Supply Water Withdrawals by Source

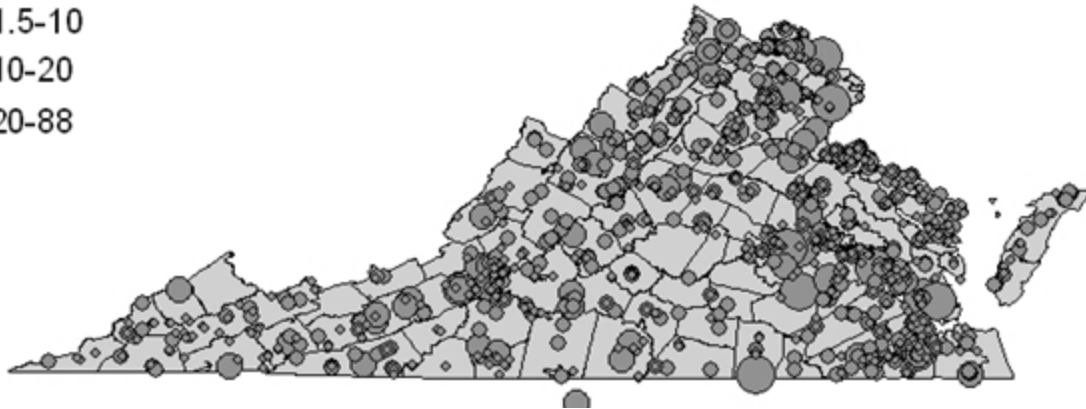




# Public Water Supply Water Use and Purchased

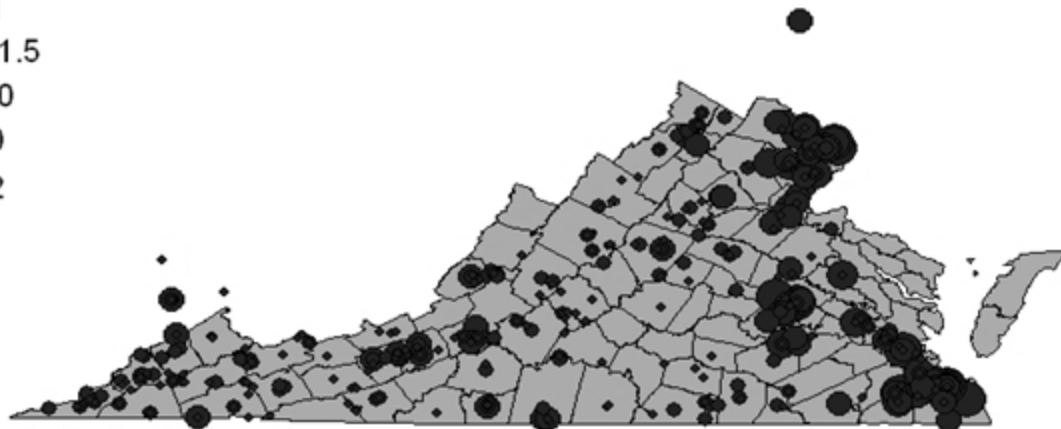
**MGD by Withdrawal Point**

- <0.01
- 0.01-1.5
- 1.5-10
- 10-20
- 20-88



**MGD Purchased**

- <0.01
- 0.01-1.5
- 1.5-10
- 10-20
- 20-62



# Top Water Withdrawals and Transfers for Public Water Supply

Owner Name	Facility	City/County	Type	Source	Avg. MGD <sup>3</sup>	2009 MGD
Fairfax County Water Authority	Potomac River WTP	Fairfax	SW	Potomac River Intake	88.9	88.5
City of Richmond	Richmond WTP	City of Richmond	SW	James River and Kanawa Canal	69.8	63.7
City of Norfolk	Western Branch Reservoir	Suffolk	SW	Western Branch Reservoir	62.6	60.8
Fairfax County Water Authority	Occoquan Reservoir	Prince William	SW	Occoquan Reservoir	63.9	56.1
Appomattox River Water Authority	Lake Chesdin WTP	Chesterfield	SW	Lake Chesdin	29.8	29.0
City of Virginia Beach	Virginia Beach Service Area	Brunswick County	SW	Lake Gaston	29.5	27.7
City of Newport News	Lee Hall WTP and ROF	Newport News	SW	Lee Hall Reservoir	26.7	25.3
Henrico County	Chickahominy River	Newport News	SW	Chickahominy River	19.7	23.7
Source		Purchaser Owner Name	Purchaser Facility		Purchaser Location	2009 MGD
From City of Norfolk		City of Virginia Beach	Virginia Beach Service Area		City of Virginia Beach	45.55
From US Government-Dalecarlia WTP		Arlington County	Arlington County Service Area		Arlington County	23.20
From City of Richmond		Henrico County	County Contract Service Area		Henrico County	19.76
From Fairfax County Water Authority		Prince William County Service Authority	OWDT Service Area		Prince William County	19.22
From Appomattox Water Authority		Chesterfield County	Chesterfield County Service Authority		Chesterfield County	18.46
From Fairfax County-Potomac River WTP		Loudon County Sanitation Authority	Lower Broad Run Service Area		Loudon County	16.86
From US Government-Dalecarlia WTP		Falls Church	Falls Church Service Area		City of Falls Church	16.60

# Number of Public Water Systems and Population Served

	Total	Groundwater	Surface water
# systems	2,879	2,492	387
population served	7,032,751	779,408	6,253,343

# Conclusions

## ➤ Challenges

- Monitoring is not always occurring where the greatest withdrawals are
- Reported data has limitations
- Funding uncertain: consistent investment needed

## ➤ Key Water Resource Signals

- Trend of increased demands on the surface and groundwater resources
- Groundwater levels along the fall line and portions of southeast Virginia are reaching critically low levels